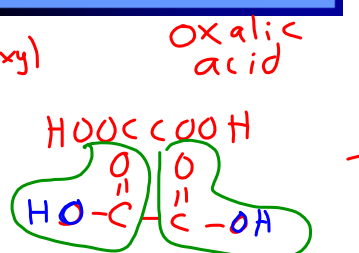
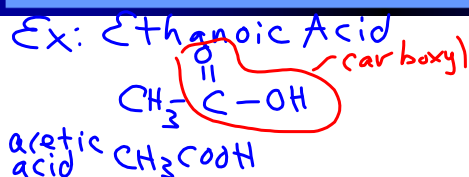


Carboxylic Acids $\begin{array}{c} \text{O} \\ \parallel \\ \text{C}-\text{OH} \end{array}$

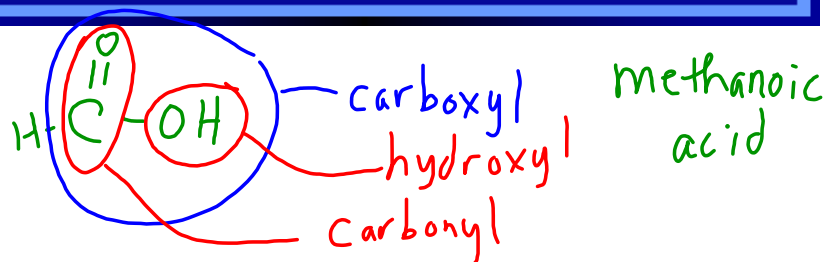
- Also have a carbonyl group (C=O), but is also attached to a hydroxyl group (-OH) = "carboxyl" group
- general formula: R-COOH
 - weak acids (ionize slightly)
- Named by replacing -e with -oic and followed by the word acid
- methanoic acid; ethanoic acid

Handwritten notes: "carboxyl" and "hydroxyl" are circled in yellow with arrows pointing to the corresponding parts of the carboxyl group structure.



Carboxylic Acids

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METHANOIC ACID or Formic Acid
(ant bites / nettles)


ETHANOIC ACID or Acetic Acid (vinegar)

PROPANOIC ACID or Butyric Acid
(rancid butter)

Oxalic Acid - the poison in Rhubarb leaves or ingredient in commercial rust remover and brass cleaners

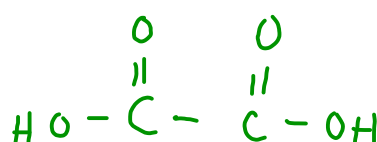
Citric Acid





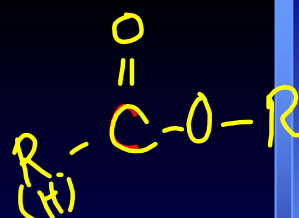
Handwritten chemical structures:

- Methanoic acid: $\text{H}-\text{C}(=\text{O})-\text{OH}$
- Ethanoic acid: $\text{CH}_3-\text{C}(=\text{O})-\text{OH}$
- Propanoic acid: $\text{CH}_3-\text{CH}_2-\text{C}(=\text{O})-\text{OH}$
- Oxalic acid: $\text{HOOC}-\text{COOH}$
- Citric acid: $\text{CH}_2(\text{COOH})-\text{C}(\text{OH})(\text{COOH})-\text{CH}_2\text{COOH}$



Esters

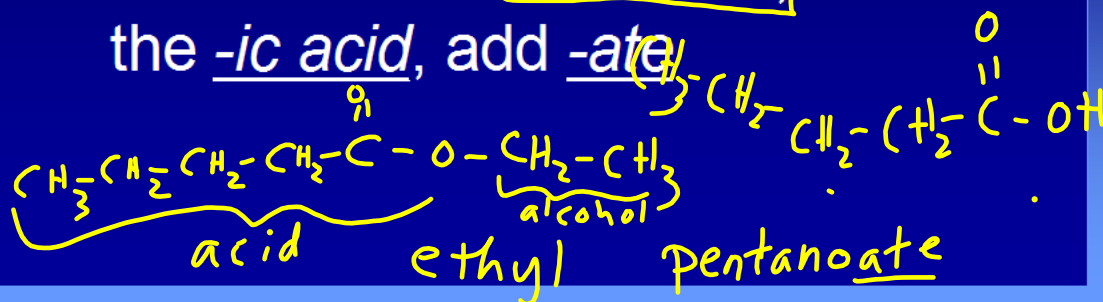
- General formula: RCOOR
- Derivatives of the carboxylic acids, in which the $-\text{OH}$ from the carboxyl group is replaced by an $-\text{OR}$ from an alcohol:
- carboxylic acid + alcohol \rightarrow ester + water
- many esters have pleasant, fruity odors - banana, pineapple, perfumes



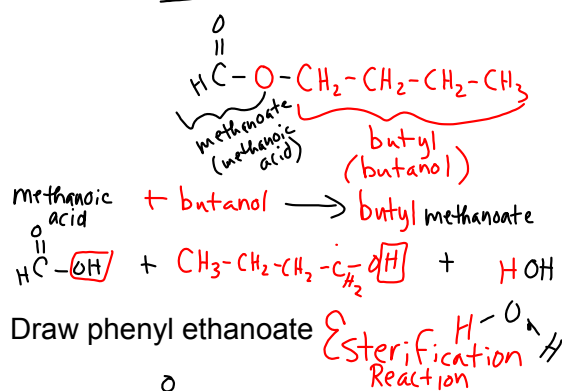
Esters

• Naming? It has 2 words:

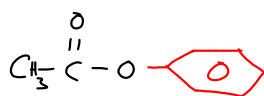
- 1st: alkyl attached to single bonded oxygen from alcohol
- 2nd: take the acid name, remove the -ic acid, add -ate



Draw butyl methanoate



Draw phenyl ethanoate



propyl pentanoate

